DOCUMENT RESUME

ED 210 027 IR 009 835

AUTHOR Katz, Ruth M.
TITLE Technology as a Factor in Library Development and Educational Change.
PUB DATE 7 Jul 81
NOTE 36p.; Paper presented at the Annual Workshop co-sponsored by Lenoir Community College and East Carolina University Library Science Alumni Association (4th, Greenville, NC, July 7, 1981).

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS Cable Television; *Delivery Systems; Educational Change; *Libraries; *Library Services; Organizational Change; *Technological Advancement; Technology; *Telecommunications; Videodisc Recordings; Videotex

ABSTRACT

Intended to inform librarians and educators about the technology-based delivery systems likely to affect education and librarianship in the near future and to persuade them to reap the benefits of these systems, this paper provides a non-technical review of telecommunications and media technologies. The relationship between technology and change is discussed, the developing role of telecommunications in society is outlined, broadband and narrowband telecommunications systems are defined, and a number of recent or potential uses of these systems are examined, including electronic mail, cable television (with special emphasis on Instructional Television Fixed Service--ITFS), videodisc systems, and teletext/viewdata systems. The use of teletext in closed-caption broadcast services and a number of prototype viewdata systems are described, with particular attention paid to the TELIDON system developed by the Ontario Educational Communications Authority (OECA). Some projections are made concerning the future uses of telecommunications-based systems to increase access to education and the range of educational opportunity, and the resultant changes facing librarians and educators are enumerated. Accompanying the text are three figures and a list of 12 references. (JL)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☒ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official NIE position or policy.

ED210027

TECHNOLOGY AS A FACTOR IN LIBRARY DEVELOPMENT AND EDUCATIONAL CHANGE

Ruth M. Katz
Associate Director of Library Services
East Carolina University

Keynote Address at the Fourth Annual Workshop
Co-Sponsored by Lenoir Community College and
the ECU Library Science Alumni Association.

July 7, 1981

IR009835

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

Ruth M. Katz

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

Additional copies may be purchased
for $3.00. Make checks payable to
Library Science Alumni Association,
1406 Rondo Drive, Greenville, NC 27834.

I think I have discovered why so many people are uninterested in or skeptical about technology and its uses. The literature is overwhelming in quantity and it is difficult to keep events in sequence because the news media report popular versions of complex technical developments or consumer-oriented products and the professional literature tends to report applications of technology in a style that is neither technically detailed nor readable.

The main concerns that we and our professional colleagues appear to have about technology are:

- Concern about the gap between technology availability and technology applications. This is usually expressed as a concern about matching technology to real needs.
- Concern that library and other educational services will become depersonalized.
- General concern about the effects of technology on what used-to-be labor intensive professions.
- Concern about societal impacts of technology—especially loss of privacy, further erosion of the copyright system which has heretofore provided incentives to information creators, etc. and . . .
- Concern about the costs involved in making a commitment to technology.

My purposes today are to inform and to persuade. To inform you about some of the technology-based delivery systems that are most likely to impact education and librarianship in the near future. Especially, to present concepts and vocabulary words that may help you to select literature to read

and to place applications of technology in your personal contact. In other words, welcome to Technology Appreciation 101!

To persuade you that you can understand enough about potential uses of technology-based delivery systems to reap the benefits from them, and also, that critical thinking about technology impacts is needed and is part of your responsibility.

Actually, most of you are already very knowledgeable about sophisticated applications of technology. Just a year or so ago, the headlines in electronics industry magazines announced that microcomputer controls had taken over in microwave ovens. If you cook with microwaves, you're already using a microcomputer. Others of you have experienced hand held calculators and video games--both of which are products in the category--consumer electronics.

I think that you'll be pleased to know that I have no plans to review the history of educational technology. Fred Hechinger has neatly summed up five of the major problems from the past. These are:[1]

- The hardware manufacturers were more sophisticated than the software/courseware producers.
- Producing effective courseware called for writing and editing skills which were in short supply.
- Competing producers of hardware made their product incompatible with the software production of competitors.
- Educators were often fearful of or hostile to technology. and . . .
- The hardware often required too much technological sophistication and costly maintenance.

In general, our attitudes toward and preferences for various technologies and content delivered through technologies are influenced by our past experiences. We are also influenced by the technology choices available today (keep in mind that the choices in Greenville may be different from the choices in Raleigh or in Washington, D. C.); by the ways in which technology-based delivery systems and issues relating to these systems are presented to us by the media, by vendors, and by professional special interest groups; and by any related social or economic concerns that may be important to us individually or in our community.

What exactly are we talking about when we say "technology" or "telecommunication"? Technology, I think, has become rather a useless term. Its dictionary definition relates to practical or industrial arts and to applied sciences. You can look at the Library of Congress T classification for verification of this.

Telecommunication is a more useful, if longer, word. It refers to any transmission, emission or reception of signs, signals, writings, images, and sounds or information of any nature by wire, radio, visual or other electromagnetic systems.[2] We can also refer to technology-based or telecommunication-based delivery systems.

It is important for you to keep in mind that there is a difference between understanding (even liking) a telecommunication-based system and understanding the uses that can be made of it. My focus today is on providing a non-technical introduction for potential users--not for

engineers or repair persons.

Please keep in mind that telecommunication is merely a means of delivering content. We are mostly interested in the quality of that content and the quality of the content is nearly independent of the delivery system. That is, properly functioning and technically sophisticated equipment cannot improve a poorly designed or presented learning module.

Also keep in mind that the cost of telecommunication equipment is decreasing but that the cost of developing program content continues to be very high. We can reduce the cost somewhat by producing program content at a higher level of generality (i.e. not site specific)--thus making programs useable with a larger number and variety of audiences.

I would like to suggest some reasons why librarians and educators of all sizes and shapes should be interested in learning about video and computer-based systems. In doing this, I first want to share some things that I found in the literature. (You'll note that some authors are not as fussy about the use of words as I would like to be).

Frederickson, in his book entitled "New Public Administration" writes about the close relationship between organizational change and "Science and Technology."[3] He says that it is increasingly apparent that although we are technologically advanced, we are also politically and administratively advanced. Our problem is--according to Frederickson--that we tend to

approach the need for change as if it were mostly a technological or scientific activity. Actually, the reverse is true--change is mostly a political and managerial phenomenon. So--technology is not synonymous with change.

I recently had the opportunity to read a draft of a paper commissioned by the National Institute of Education. The paper was about rural southern values and attitudes and about how these are barriers to women in non-traditional vocational education. Writing about how values can change, the authors say that "Improvements in technology, especially in media technology, social, and geographic mobility, and changes in political and economic structures contribute nationwide to systematic changes in value structures." They say that "the communications "revolution" and the Civil Rights Movement have helped to bring the rural South more into the mainstream of American Life."[4]

I'm not sure about the validity of that conclusion but I do appreciate the fact that media technology and politics--in combination--were given credit for what seems like positive change.

Now let me shift to an author who begins his book with the simple statement "This book is concerned with understanding media in education."[5] The author is Gavriel Salomon and the book is titled "Interaction of Media, Cognition and Learning." The book is about as "heavy" as its title, but is excellent. This book emphasizes a point that I tried to

make earlier--"the essential differences between media are the ways in which they structure and convey contents--and not their technological differences in communicating contents--although these do exist." Salomen points out that the technology of a medium affects the modes of interactions with users--and the transmitted content affects the knowledge acquired.

It is very helpful to keep this difference in mind. Finally--another very important point from Salomen. He writes that:

> It is never only a technology that is being introduced. The introduction of a new technology is accompanied by access to new contents, access to newly designed curricula, involvement in new social situations, or in the development of new personal and social techniques. When only a technological change is introduced and everything else is held constant--no great changes can be observed.

That I believe is a major problem. It was not long ago that Susan Martin observed that "Thus far, network implementation in libraries has been aimed chiefly at automation of manual procedures, rather than at fundamental change in the use of the library by staff and patrons."[6] Perhaps the prospect for fundamental change is a little brighter in education although Allan Hershfield has referred to education's technological revolution as "an event in search of leaders."[7]

I think that you eventually will come to believe that telecommunication-based systems can help to increase the closeness between schools and libraries and the communities in which they are located. If this happens, such systems

may be an economic plus because taxpayers who do not have children in school and do not use libraries now may begin to look with more favor on taxes necessary to support such public services.

If you are wondering what changes have occurred that cause me to make such outrageous statements--consider this. Control over media is going to the public--home video recorders, personal computers, video games, etc. are giving us control. Our TV sets are merely multipurpose display units. They can provide two-way interaction, programming of any length, scheduling at the user's convenience, and programs designed for a variety of special audiences. As one author has put it--we are moving from a society in which the focus has been in information transmission via books, chalk, and people to a focus on information processing with people acting as mediators.[8]

There are other changes too. Until now, many newer telecommunications systems were used between and among institutions or organizations. We did not have much experience sending programs into individual homes. And the early consumer electronics items were for one person at a time to use (e.g. calculators) and/or not involving children in the home setting (e.g. CB radio--mostly used in cars and trucks by adults having drivers licenses).

The changes are not coming from new technology alone--but from changing assumptions about the role of telecommunications in society. For libraries,

slowness in making innovative uses of telecommunications technologies is attributable, in part, to disagreements or multiple points of view about the role of the library in its community setting. Publicly supported libraries, including state libraries and some academic libraries, especially those at community and junior colleges, are reexamining their philosophies with respect to users served, services provided, and sources of funds available. For libraries that eventually will assume responsibilities in adult education, linkage with other service agencies (including schools), information and referral services, advocacy, and community center operations, maximal exploitation of telecommunications options will be the means to new ends. Of course, the prospect of new services also rekindles the arguments about fees for services.

For schools and colleges, the capabilities of the telecommunication-based delivery systems will facilitate the trend in education to a more open learning environment. The two-way exchange of information, less centralized control and more broadly-based curricula are part of the trend. In every community, the education system should be a community-wide resource.

TELECOMMUNICATION TECHNOLOGIES AND APPLICATIONS

Now I would like to spend some time reviewing telecommunication technologies that,I think, are especially important for you to know about.

Satellite Business Systems, Inc. estimates that the communications and related information services industry will grow from $25 billion in 1980 to $100 billion by 1989!

First, I would like to give you a useful, non-technical definition. Telecommunication systems are typically categorized as either narrowband or broadband. Narrowband systems typically use telephone lines and are suitable for relatively low rates of information or data transfer including audio, low-speed data (e.g. teletype), facsimile, slow-scan television, and telemetry (e.g. transmitting electrocardiograms). Broadband systems can transmit information at a relatively high rate. These systems include cable or broadcast television (both video and audio signals are transmitted continuously), some microwave radio systems, and Instructional Television Fixed Service(ITFS). You've heard a lot about satellites. A communications satellite is one part of an electronic delivery system. It can receive and transmit all types of electronic signals: telephone, television, radio, digital data, facsimile, etc.—that is, a mix of broadband and narrowband services.

Figure 1 displays some of the changes in communications technology that Daniel Bell reported as early as 1977.

ELECTRONIC MAIL

I think you will be hearing a lot more about electronic mail. Familiar

Figure 1

FIVE MAJOR CHANGES TAKING PLACE IN COMMUNICATIONS TECHNOLOGY (1977)

1) INTERMESHING OF THE TELEPHONE AND COMPUTER SYSTEMS, OF TELECOMMUNICATIONS AND TELEPROCESSING INTO A SINGLE MODE.

2) SUBSTITUTION OF ELECTRONIC MEDIA FOR PAPER PROCESSING.

3) EXPANSION OF TELEVISION, THROUGH CABLE SYSTEMS, TO ALLOW FOR MULTIPLE CHANNELS AND SPECIALIZED SERVICES AND THE LINKAGE TO HOME TERMINALS.

4) THE REORGANIZATION OF INFORMATION STORAGE AND RETRIEVAL SERVICES TO ALLOW FOR INTERACTIVE NETWORK COMMUNICATION.

5) THE EXPANSION OF THE EDUCATIONAL SYSTEM THROUGH CAI, USE OF SATELLITE COMMUNICATIONS AND VIDEODISCS.

(BELL, DANIEL. TELETEXT AND TECHNOLOGY, NEW NETWORKS OF KNOWLEDGE AND INFORMATION IN POST-INDUSTRIAL SOCIETY. ENCOUNTER. VOL. 48, 1977, PP. 9-29.)

forms of electronic mail include telegrams, mailgrams, and telex services. These services provide for electronic transmission of messages for which input has been made by telephone, magnetic tape or discs, or teletypewriter equipment. The output is printed at the receiving end on the recipient's own equipment or telephoned to the recipient with hardcopy delivery later.

Increasingly, electronic mail includes facsimile and communicating word processor equipment. In facsimile transmission, alphanumeric or graphic information--handwritten or printed--is fed into transmitting equipment and electronically transmitted to a remote site where it is reproduced.

Word processors enable us to put words or characters on paper and communicate the information electronically. We can use the word processor to type, edit, and store information and to retrieve information in hard copy or on the video display screen. The recipient of a message can read it, store it in the system, print it, put it in a file, make a response, etc.

Electronic mail systems can improve management and clerical functions, reduce paper volume, and increase communication speed.

The U. S. Postal Service is planning an Electronic Message Service System (EMSS). It is to be a multimedia program for next day delivery of 95% of the letter mail it handles. EMSS is being designed to accept tapes,

discs, and direct computer input plus hardcopy for contracted carrier delivery to any one of 87 proposed postal locations. The messages are printed at the receiving facility, put in envelopes and prepared for carrier delivery. USPS expects the first 15 sites to be operational about 1985. As of about a year ago, the Postal Service had spent about $19 million on development of EMSS.[9]

If some of you have had experience with facsimile transmission and think it is too slow, take heart. Satellite Business Systems has a prototype copier that scans documents at 30 pages/minute and prints at 60 pages/minute. Facsimile speeds specifically as well as transmission times for all kinds of communications are increasing through the use of fiber optics, microwave radio links, and communication satellites.

CABLE TELEVISION

Just a few words about cable television. Currently, there are about 4,000 cable systems serving 9,000 communities and 40 million people. With deregulation and with communication satellites to deliver entertainment programming from non-broadcast sources, the future for cable systems looks very bright. We are likely to see 36 channel capacity on many new systems and, with the use of fiber optics, as many as 500 channels are thought to be possible.

Cable systems, as you know, can now produce their own programming and can

provide two-way capability for shopping, banking, etc. This will become more apparent when I talk about viewdata services. Libraries are increasingly interested in cable programming. This topic is receiving good coverage in the library literature so I don't feel the need to go into it any more now.

INSTRUCTIONAL TELEVISION FIXED SERVICE (ITFS).

In 1971, the FCC established 28 channels in the microwave portion of the electromagnetic spectrum, mandated the use of these channels exclusively for non-profit educational purposes, and ruled that this ITFS spectrum can be used for two-way as well as one-way TV communications. Institutions can get an ITFS license to operate up to four video channels + audio channels. Because the microwave frequency extends for only 25-30 miles, the FCC can assign the same channel to geographically separate institutions in different parts of the country.

ITFS systems use low power (ten watt) equipment which is relatively inexpensive and which has a range of about 20 miles from a 200-foot antenna tower.

ITFS equipment is solid state and simple to operate. It can be installed in a truck and used as a mobile transmitter/receiver studio. In general, ITFS is ideal for many educational and library uses. School systems in Birmingham, Alabama and in Milwaukee have already demonstrated the usefulness of ITFS systems, but the best example is much closer to us.

It is the Center for Excellence, Inc., a not for-profit educational research and resource development corporation located in Williamsburg, Virginia. Centex goals are to identify and define major unfilled educational needs in its geographic service area; to develop curricula, teaching capabilities and resources to meet these needs; and to make intensive use of electronic technologies to increase teaching effectiveness and the distribution of educational services. Centex staff completed intensive studies of needs, including preferred frequency of classes and topics of interest to teachers. They studied population characteristics, made contacts with a university and documented the advantages and disadvantages of six major telecommunications methods, before choosing ITFS.

VIDEODISC SYSTEMS will be of major importance in schools and libraries. There are two categories of videodisc players. Mechanical players (e.g. RCA) operate by maintaining mechanical contact with a spinning disc. This method is less expensive but the discs wear out sooner and the user is not able to move forward and backward through instructional materials or to freeze frames. Optical videodisc players (e.g. MCA/Philips) use a low-powered laser beam to read from the disc. Dirt, scratches, etc. don't penetrate the disc and do not cause degradation of image. These players are for the commercial and educational market. A user can find and display

any one of the 50,000-100,000 frames or pages of information on the disc, can move forward and reverse on the disc, and can use slow motion. One disc is equal to 30-60 minutes of film.

Optical videodisc players are being used in combination with a computer which controls access and provides an interactive learning environment. Only a small amount of memory is needed because some of the frames from the disc can be used to store digital instructions and data for the microprocessor. With an interactive optical videodisc, you can combine video sequences, slides, audio and computer code right on the same disc.

When a large number of images is required (e.g. 1,000 or more) or a large number of copies can be used (100 or more), no system is cheaper than videodisc. The problems are not with videodisc technology but with instructional technology. To be cost effective, each disc must be produced in reasonable quantity. Instructional designers must keep in mind that content has to be developed and presented differently from that given as class lectures. One author suggested that, if we can't do this, we should leave videodiscs for the entertainment industry.

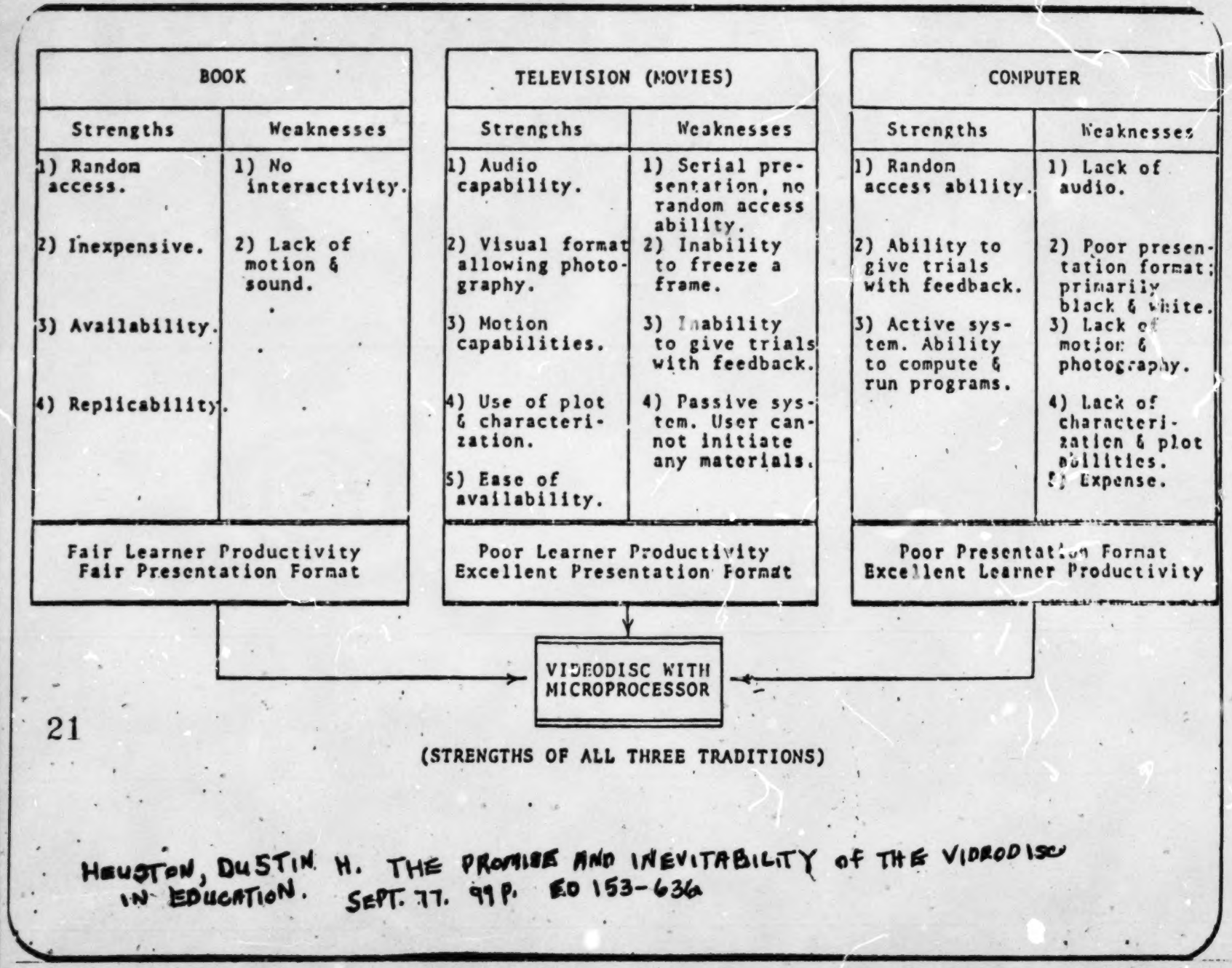
It is a rule of thumb that for a display system to provide instructional effectiveness, it should be able to interact with users, it should provide for information presentation by various media, and it should allow for individualization of instruction (choice of medium, cognitive style, level of proficiency). When the content is properly developed, a videodisc

combines the strengths of books, television, and computer-assisted instruction. Figure 2 shows how the three traditions come together.

I would like to tell you about videodisc system development efforts at the Nebraska ETV Network where a Videodisc Design/Production Group has been established. This group includes designers and producers specifically concerned with the development and production of programs that exploit the unique capabilities of the videodisc. The Group was formed in 1978 under a grant from the Corporation for Public Broadcasting to investigate the applications of videodisc technology on behalf of public and instructional television, to design and produce videodiscs for a wide range of educational applications, to develop production methods for pre-mastering and to disseminate research on videodisc formats, design/production, and potential educational/industrial/ commercial markets for videodisc technology.

The Nebraska Group has developed a low cost text/graphics interface mechanism to link videodiscs with personal computers. They are now working with a third generation design that is completely external. The plan is that the finished version will contain its own character generator and microprocessor capable of talking to several different personal computers (APPLE, ATARI, etc.). This unit might cost $1,000 now—it would cost much less if it were to become widely available in the competitive marketplace.

Figure 2



21

22

HOUSTON, DUSTIN H. THE PROMISE AND INEVITABILITY OF THE VIDRODISC IN EDUCATION. SEPT. 77. 99P. ED 153-636

Another product developed by the Nebraska staff is a videodisc Simulator/Editor. This unit simulates the functional capabilities of a disc player. This piece of equipment is needed because a program producer must be able to evaluate content, sequencing, formats, etc. and make necessary changes before a disc master is made. Keep in mind that videodiscs are a "read only" medium—discs cannot be erased and re-recorded. The Nebraska Group has defined four levels of videodisc players as shown in Figure 3.

If you still think that videodisc systems are not yet ready for your use, consider the fact that General Motors has already bought 11,000 videodisc players and produced more than 100 disc titles.

Much of the videodisc fervor seems to be in the West. The University of Utah has a software group in a video computer learning project and Utah State University has a videodisc innovation project. The National Library of Medicine and MIT are conducting R & D projects too.

TELETEXT/VIEWDATA SERVICES[10]

The final type of information delivery system that I want to bring to your attention is perhaps most notable for its confusing terminology. We have teletext services - teletext being the generic term used to describe the one-way broadcast of text and graphics as part of the TV signal.

Viewdata services are another generic class of services providing transmission of information on an interactive basis--typically through the telephone network, Cable TV, or private networks. The confusion comes because videotex was chosen as the generic name by a committee of the International Telecommunications Union. Thus, recent publications by our own government use the terms broadcast videotex for the one-way system, and interactive videotex for the two-way system. In English-speaking countries, viewdata and teletext seem to be the popular terms for the two levels of service. Let's talk about teletext services first. With teletext, pages of weather information, stock market reports, theater listings, etc. are transmitted via commercial or public TV channels to your modified home TV receiver. The information can be captured and recorded using decoder boxes for display on the TV screen. The capacity of a teletext system is set by the number of pages transmitted per second and the length of time that a user is willing to wait for the desired pages to appear on the TV screen. The viewer punches in the page numbers of the desired two-four pages using a hand-held keypad. Pages are stored and retrieval is accomplished from the decoder memory.

At present the British systems can provide up to 800 pages per channel (up to 100 words per video frame or "page"). Information can be displayed in color or in black and white and the data may overlay or replace the TV program being shown.

Figure 3

FOUR CATEGORIES OF EXISTING VIDEODISC PLAYERS

BASIC PLAYER

LOW COST CONSUMER MODEL DESIGNED FOR REAL TIME PROGRAM PLAY.

LEVEL ONE PLAYER

CONSUMER MODEL VIDEODISC PLAYER WITH FREEZE FRAME, AUTO-STOP, CHAPTER SEARCH, AND DUAL AUDIO, BUT WITH LIMITED RANDOM ACCESS, LIMITED MEMORY AND NO PROCESSING POWER.

LEVEL TWO PLAYER

AN EDUCATIONAL/INDUSTRIAL MODEL VIDEODISC PLAYER WITH ALL THE CAPABILITIES OF A LEVEL ONE PLAYER PLUS RANDOM FRAME ACCES AND A BUILT-IN PROGRAMMABLE MEMORY.

LEVEL THREE PLAYER

THE EDUCATIONAL/INDUSTRIAL MODEL INTERFACED WITH A COMPUTER.

The frequency of information update is a function of economics - not any technical constraints. Remember that the information available in this one-way system is under the user's control only to the extent that several pages per second are displayed on the TV screen for review. A small number of such pages can be captured for viewing one page at a time.

One purpose for which one-way teletext is excellent is closed captioning. This is a system of translating TV dialog into sub-titles that appear on the screens of specially equipped TV sets. In March 1980, PBS, ABC, AND NBC began broadcasting 16 hours of mostly prime-time programming produced by the National Captioning Institute, Inc. At the end of 1980, NCI was captioning 30 hours of programming per week - and hopes to double that amount by the end of 1981.

NCI is working toward two new services—

- Captioning live broadcast sports events - using electronic scoreboards in stadiums. A computer interface takes the information from the scoreboard and transmits it for broadcast. This is - condensed reporting - not play by play of an entire sports event.

- Real time broadcasting of events. The inauguration of Ronald Reagan was the first effort. NCI had advance copies of major speeches and the script for the ceremony. They are working toward the use of a stenotype device - a computer to translate phonetic output into English text.

Captioning is also useful for producing subtitles in a foreign language. But NCI is working toward captioning in English plus a second language simultaneously.

Closed captioning originated because of the needs of the hearing impaired. The numbers are impressive: in the United States, there are 2 million deaf individuals and 14 million who are hard of hearing.

Sears, Roebuck Company sells two types of decoders under the trade name Telecaption. One is an externally mounted adapter costing about $250 and one is part of an integrated TV receiver with built in decoding circuitry. This TV set sells for about $500. Sears sells the adapter on a non-profit basis and the TV set at below normal mark up. The IRS has ruled that the cost of the adapter or a portion of cost of the TV set is deductible as a medical expense.

Viewdata systems that are fully interactive most often use telephone lines to supply information from a data memory bank and a central computer processor. Your home TV receiver becomes a display terminal when it is modified to include a character generator set and a decoder box to interconnect the TV receiver and the telephone. Each user has an account identification code and uses a keypad to make specific requests from computer data files. A user presses the service request key to change from conventional TV reception to viewdata reception and display. This action also notifies the user's decoder(microprocessor) to initiate a telephone connection to the computer and to accept the requested information from the data bank. The user's ID number is transmitted to the computer center for billing.

With proper use of the keypad, the user can search data banks and display pages of information according to the topic requested and the required level of detail. Browsing is possible—using a variety of interrogation strategies. The cost of using a viewdata system is generally a charge per page plus time/distance charges for the telephone line connection.

Many of you are familiar with the information services that can be accessed through Source Library Services, Inc. These information services are not viewdata in the sense that a computer terminal is used as the display device. Now, of course, some terminals can be connected to a TV set and their output displayed on the TV screen. A Source user needs an acoustic coupler, a CRT terminal and a personal computer. The plan is to offer more than 2000 programs - including text editing, tax preparation, games, airplane ticketing service, UPI newswire and electronic mail.

Many of you are also familiar with the PLATO system which already has 1700 terminals at 60 sites, a large central computer and peripherals, user-oriented terminal equipment, and 17 years of educationally oriented software development experience. This system has great potential as a business and social service information medium for the public.

The National Telecommunications and Information Administration of the U. S. Department of Commerce has identified five factors important to development of teletext and viewdata systems in the United States. These factors are:

- Determination and resolution of standards—nationally and internationally.
- Thorough analysis of potential social problems—including privacy.
- Resolution of policy issues (e.g. regulation).
- Intensive economic analysis (start up costs, etc.).
- Network planning to provide the necessary interfaces and interconnects for viewdata or teletext systems which are not directly compatible.

Some work has been done in the area of standards. Technical authorities in the United Kingdom have defined a multi-level teletext standard and submitted it to various international standards bodies and to the FCC. In the United States, a subcommittee of the Electronics Industries Association is working toward developing a national teletext standard for this country. The United Kingdom definition takes into account all currently conceived and projected technology.

We cannot underestimate the importance of the teletext and viewdata systems already developed outside the United States. The British, Canadian, and French systems have offices or representatives in the Washington, D. C. area. The Canadian viewdata system—called TELIDON—is already technically advanced and is seeking to achieve an advantage

in the area of educational applications. Much of the work is being done by the Ontario Educational Communications Authority (OECA) which has the responsibility to produce and distribute programs and materials in the educational broadcasting and communication fields—for all residents of Ontario Province. OECA works with the schools and directly with people at home who are not part of any formal educational process.

OECA wants to develop educational applications of teletext and viewdata in a major way. In a field trial that started in January 1980—55 TELIDON terminals operating both in interactive and broadcast modes—were placed in schools, colleges, libraries, science museums, and individual homes. OECA also is participating as an information provider in a trial of the Bell Telephone VISTA System and in the Canadian Cablesystems TELIDON trial.

The OECA trial has some technological objectives (e.g. looking at different rates of data transmission), some information management objectives relating to the creation of pages and sequences and to the organization of data bases, and some objectives relating to educational applications—for example, looking at the role of educational institutions as information providers and the role of public libraries in providing public access.

I have not yet seen a report of the results from the field trial or final details of a Washington, D. C. field trial of TELIDON scheduled to have started this past spring.

CONCLUSIONS.

I hope that we can think of telecommunication-based systems as human-centered means to increased opportunities for educational development and access.

Really, it's hard to avoid thinking about the possibilities. Just in the past year or so the Corporation for Public Broadcasting announced the Annenberg Higher Education Telecommunications Project--a 15-year plan to develop college level courses--and the National University Consortium for Telecommunications in teaching was established at the University of Maryland. The Maryland project plans to make a Bachelor's degree program available to home-based adult students through television and the directed study system developed by the British Open University. Today you can't get on an airline or receive a new issue of a professional journal or check your mail at home without confronting news about computers and instructional systems.

I think that we can agree that libraries and schools add to the quality of life in a community. I also think that the number of skeptics in the community is increasing. Thus, there is a need for us to devote considerable attention to the known and potential impacts of technology-based delivery systems. In 1980, the National Telecommunication and Information Administration published a report on videotex systems. I'd

like to read a portion of the preface which talks about the need for a "highly critical evaluation of a whole group of technological building blocks which already exist." The preface goes on to say:

> We already have all the pieces provided for user-oriented national or international computer-based communications and information networks. The terminals are as close to our office or home as are the ubiquitous telephones, and as viewable as the (almost) standard home television receivers. In other words, the technologies are existent. The new systems may be provided in many forms of convenience and over a wide range of costs; the information may be delivered by a few of the many transmission systems now widely in use. The implications of such a computer society have not been effectively evaluated. There are numerous economic and social implications which are beyond the scope of this report. Moreover, the degree to which the public will accept such services is unclear.[10]

Educators and librarians share all of the general concerns that are most frequently listed--especially concern about the increasingly fuzzy distinctions between entertainment, publishing, and instruction, and the growing feeling that copyright laws or other means of controlling reproduction are unenforceable.

There are several specific needs and changes that I think will be important for libraries and other educational institutions.

First, to take full advantage of the technology-based systems we will need to have fewer political jurisdictions and more larger units of service. In our own area, that might mean strengthening county government.

With this change, schools, school libraries, public libraries and community colleges or technical institutes might be expected to share investments in technology and courseware developments and to work toward shared use of buildings over a larger number of hours each day.

Second, I think there will be a 70-80% decline in the effort spent on so-called technical services in libraries and a similar decline in the amount of effort spent on clerical work in schools. There will be much more time available for teachers and librarians to do their professional work and to individualize services. At last, we may find out if librarians have or want to have client relationships with users.

Third, I think that competitiveness in the library services market will be facilitated by technology-based systems. Libraries will promote access by reducing non-price barriers (these barriers include service limits, hours of service, and social distance) and thus increase the likelihood that public and private sector roles will be clarified.

And fourth, I think the matter of fees for services will disappear as an issue. This will occur, in part, because individuals who buy home-based information systems already will be making an investment in the information marketplace, and in part, because libraries will not incur new costs as they shift from traditional services to technology-

based service delivery. In fact, libraries may gain revenue from newer services by acting as a retailer or service provider for some for-profit information marketers.

I'd like to close with two thoughts. First--the need to interrelate the humanities, social sciences, science and technology is very great today. As pointed out by the Commission on the Humanities in its 1980 report--"-Collaboration among humanists, scientists and technicians is insufficient"- and"the general impression persists that the humanities and sciences form two separate cultures, neither intelligible to the other." This impression, the Commission says, indicates a fundamental kind of illiteracy.[11]

Secondly--my own feelings are summed up in a recent statement by Dan Lacy.

> The new technologies are mostly doing things the printed book and library never did very well, rather than displacing them in their inherent function.[12]

If you'll keep those thoughts in mind, you should have no fears while listening to our other speakers today.

REFERENCES CITED

1. Hechinger, Fred M. "Forty Years of Educational Technology," in The Communications Revolution and The Education of Americans, ed. Council on Learning (New Rochelle, New York: Change Magazine Press, 1980), p.6.

2. General Services Administration, Federal Supply Service, Federal Standard 1037. Glossary of Telecommunication Terms (Washington, D. C.: GSA, July 1980), p. 107-108.

3. Frederickson, H. George. New Public Administration (University, Alabama: University of Alabama Press, 1980), p. 53.

4. Carney-Taylor Associates. "I Don't Want to Drive A Mack Truck. Rural Southern Values and Attitudes--Barriers to Women in Non-Traditional Vocational Education." Report to NIE. November 30, 1980. 50 p. (Unpublished).

5. Salomon, Gavriel. Interaction of Media, Cognition and Learning (San Francisco: Jossey-Bass, 1979), p. 1.

6. Martin, Susan K. Library Networks 1976-77 (White Plains, New York: Knowledge Industry Publications, 1976), p. 9.

7. Hershfield, Allan F. "Education's Technological Revolution: An Event in Search of Leaders," Change. vol. 12, no. 8 (Nov.-Dec. 1980): 48-52.

8. Braun, Ludwig. Microcomputers and Videodisc Systems: Magic Lamps for Educators? (Bethesda, Md.: ERIC Document Reproduction Service, ED 154 834, 1977), 77 p.

9. U. S., General Accounting Office. Implications of Electronic Mail for the Postal Service's Work Force, by the Comptroller General of the United States, GAO Report B 114874 (Washington, D. C.: U. S. General Accounting Office, 1981), GGD 81-30.

10. U. S., Department of Commerce, National Telecommunications and Information Administration. VIDEOTEX Systems and Services, by L. R. Bloom et al., NTIA Report 80-50 (Washington, D. C.: Government Printing Office, 1980), 158 p.

11. Commission on the Humanities. The Humanities in American Life: Report of the Commission on the Humanities (Berkeley: University of California Press, 1980).

12. An Information Agenda for the 1980's: Proceedings of a Colloquium, ed. Carlton C. Rochell (Chicago: American Library Association, 1981), p. 12.

Special thanks to Nancy Davey for her bibliographical expertise and patience in editing this list of references.